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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/813,330

03/30/2004

Jong-myeong Lee

5649-1205

5124

20792

7590

02/27/2006

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EXAMINER

EVERHART, CARIDAD

ART UNIT

PAPER NUMBER

2891

DATE MAILED: 02/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/813,330	LEE ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Caridad M. Everhart	2891	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 December 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1,6,13,14, and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anna, et al. (US 2002/0072195A1) in view of Ebertseder, et al. (US 2002/0019880A1).

Anna, et al discloses a process which includes the steps of forming an insulation 1 shown in Fig. 20. Forming an opening shown in which is formed a titanium and TiN layer stack (paragraph 0070)(feature 4 in Fig. 20). A further layer of W is shown(feature 5)(paragraph 0079). The opening is filled with SOG(feature 10)(paragraph 0079) and polished back by CMP(paragraph 0104). Photoresist may be used instead of SOG(paragraph 0101). Layer 18 shown in Fig. 20 is also insulation(paragraph 0114). The upper surface of metal is removed by CMP(Fig. 21).

Anna, et al is silent with respect to the further steps of filling the trench and polishing the fill layer.

Ebertseder, et al discloses that an alignment mark trench is filled with metal(paragraph 0031) and planarized with CMP(paragraph 0031).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined the steps taught by Ebertseder, et al and the process taught

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by Anma, et al because Anma, et al discloses a method for forming an alignment marking trench, and the steps of filling and planarizing would follow the steps taught by Anma, et al.

Claims 2-5,7-12, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anma, et al in view of Ebertseder, et al as applied to claim 1 above, and further in view of Ho, et al. (US 6,645,851B1).

Anma, et al in view of Ebertseder, et al is silent with respect to dual damascene.

Ho et al discloses that the method of forming a damascene pattern using sacrificial material may also be applied to dual damascene patterns (col. 3, lines 28-38), and dual damascene patterns have a via hole connected to a trench pattern above the via opening. The method disclosed by Ho, et al B uses a removable photoresist layer (col. 10, lines 59-62). The photoresist is etched back using developer(col. 4, lines 20-23). The photoresist may be removed using ashing(col. 4, lines 38-43). With respect to the relative etch rates, it is well known that the etch rates of oxide and photoresist are different.

It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined the teaching of Ho, et al with the process taught by Anma, et al in order to obtain the benefits of the protection of the layers in the damascene structure in the same way as the layers of the alignment mark trench taught by Anma et al in view of Ebertseder, et al.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Anna, et al in view of Ebertseder, et al and further in view of Ho, et al as applied to claim 14 above, and further in view of Nishimura, et al.

Anna, et al in view of Ebertseder, et al and further in view of Ho, et al does not teach the reflow step.

Nishimura et al discloses reflow of Al in a via will increase the quality of the filling by having no void in the opening(page 171, last paragraph). Nishimura discloses the flowing of the aluminum in a via opening(page 171, second paragraph).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have flowed the Al as taught by Nishimura, et al in the damascene structure taught by Anna, et al in view of Ebertseder, et al and further in view of Ho, et al in order to avoid the formation of a void in the openings.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, B. Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*C. Everhart*  
CARIDAD EVERHART  
PRIMARY EXAMINER

C. Everhart  
2-14-2006